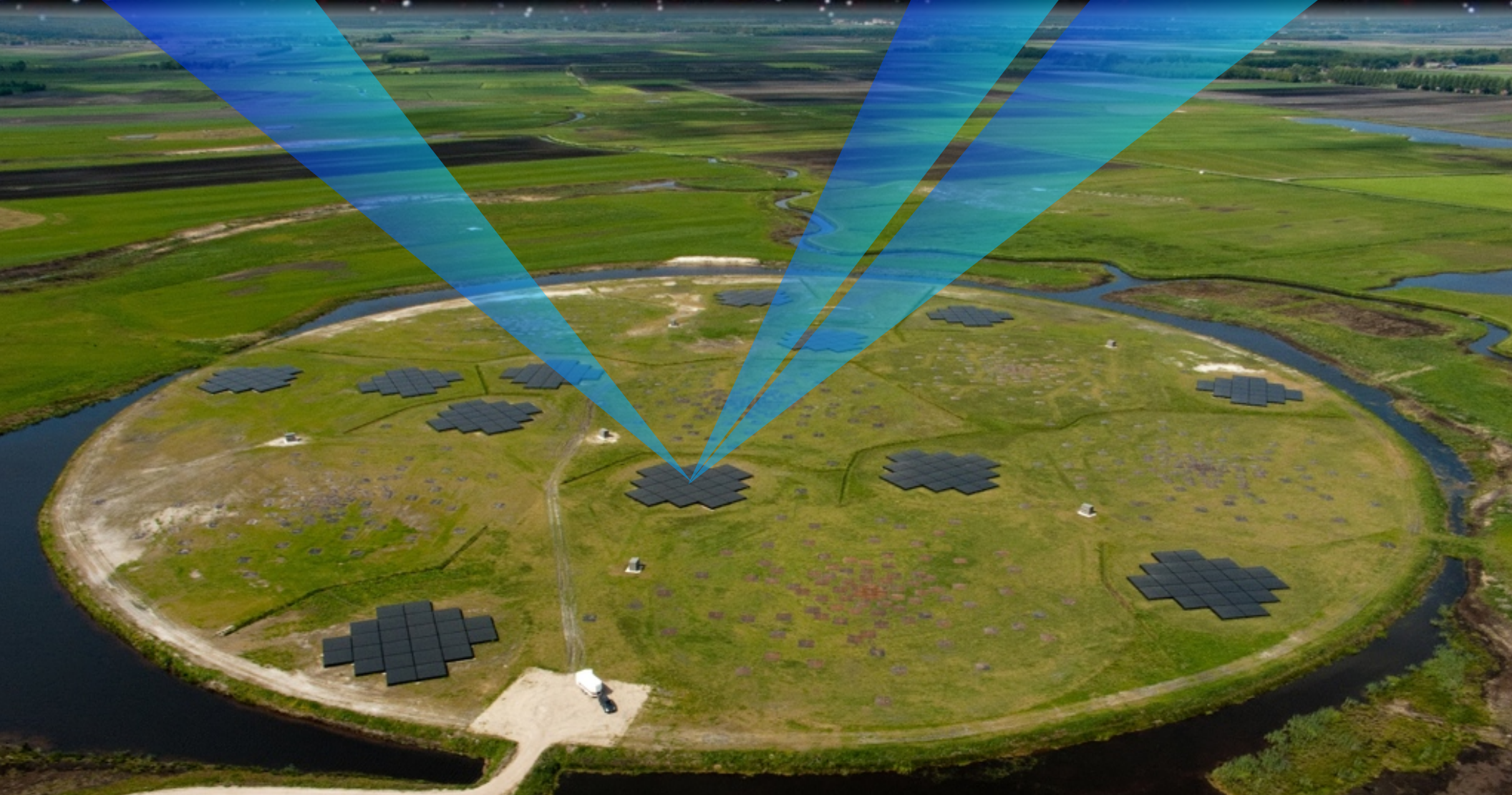


# Status update on LOTAAS and ms-pulsar observations

LOFAR Pulsar Working Group





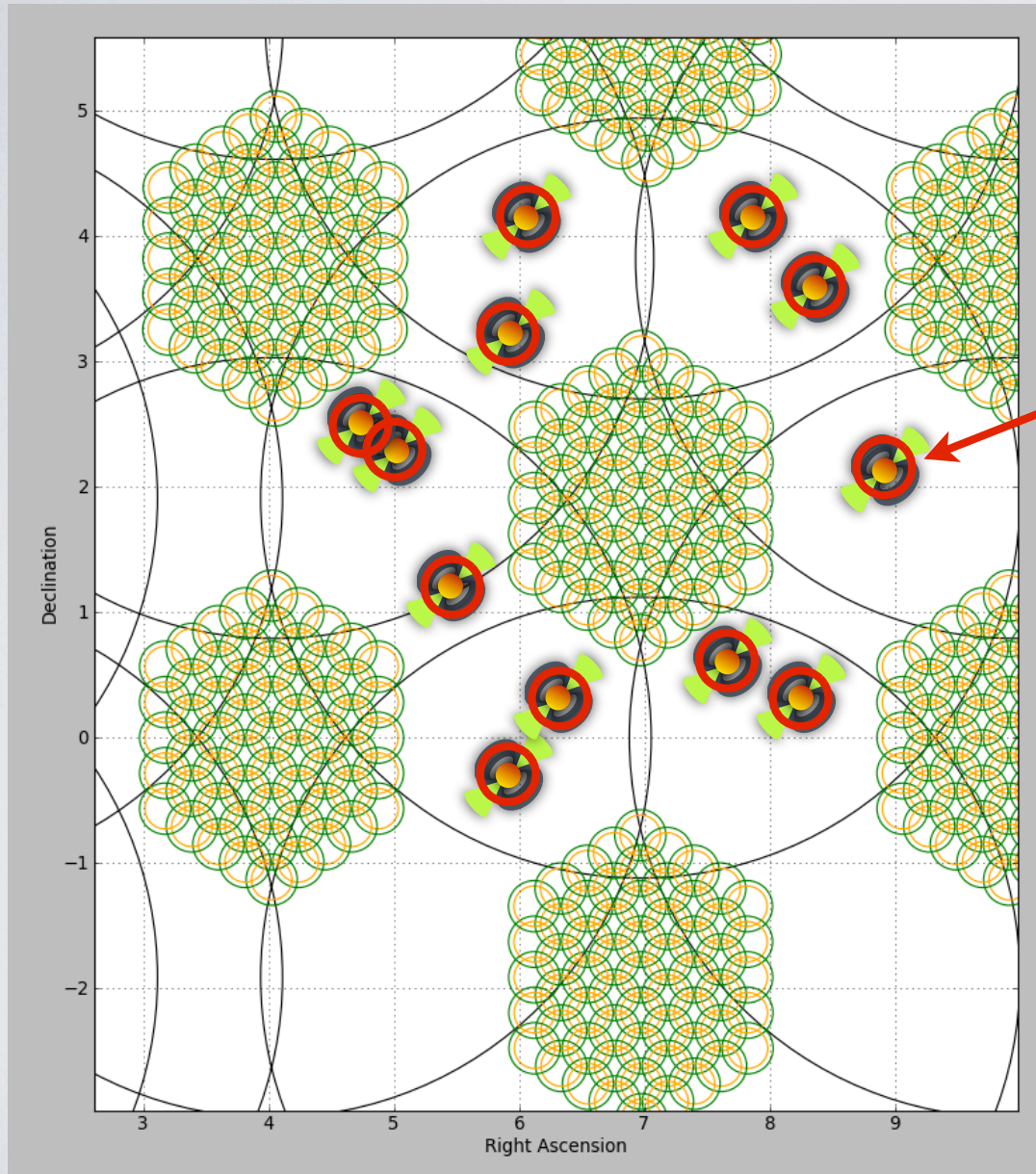
# LC0\_34

## LOFAR Tied-Array All-Sky Survey (LOTAAS)

- Use 8-bit mode
- 3 SAPs of 32MHz each (119-151MHz)
- 1hr per pointing (1.5hr all-sky by end... new param. space)
- 0.49ms time resolution, 12kHz frequency channels
- Find millisecond pulsars out to DM  $\sim 50 \text{ pc cm}^{-3}$
- 219 tied-array beams, 3 incoherent beams
- 12 sq deg. total per ptg. from tied-array beams
- 60 sq deg. total per ptg. from incoherent beams
- Sparse coverage of North. Hem. takes  $\sim 333$  pointings
- Dense coverage of North. Hem. takes  $\sim 1000$  pointings

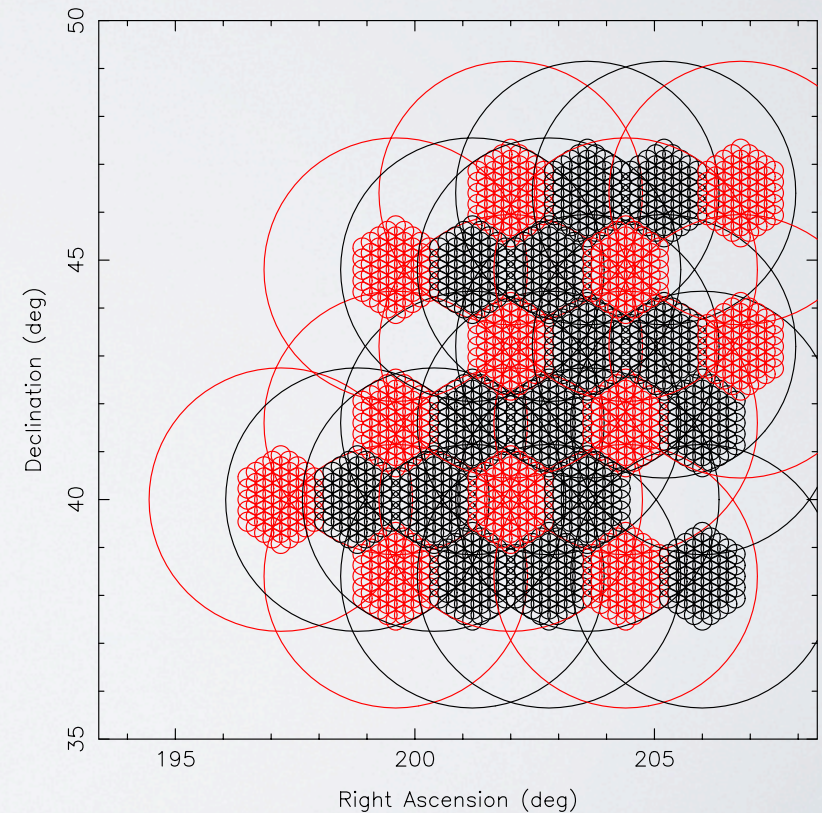


# LOFAR Tied-Array All-Sky Survey (LOTAAS)



- ~2x more sensitive than LOTAS (coh. pilot survey)
- ~2x more sensitive than LPPS (incoh. pilot survey)

24 LOFAR first detections now made in this way!!! (Maura Pilia)





# LOTAAS Observing So Far...

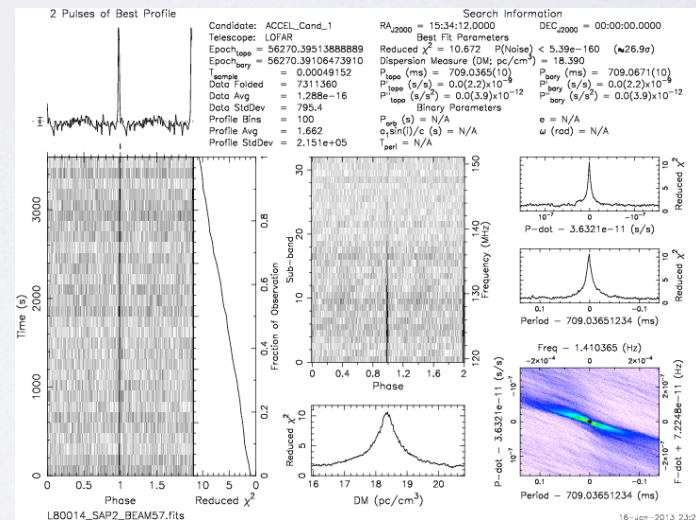
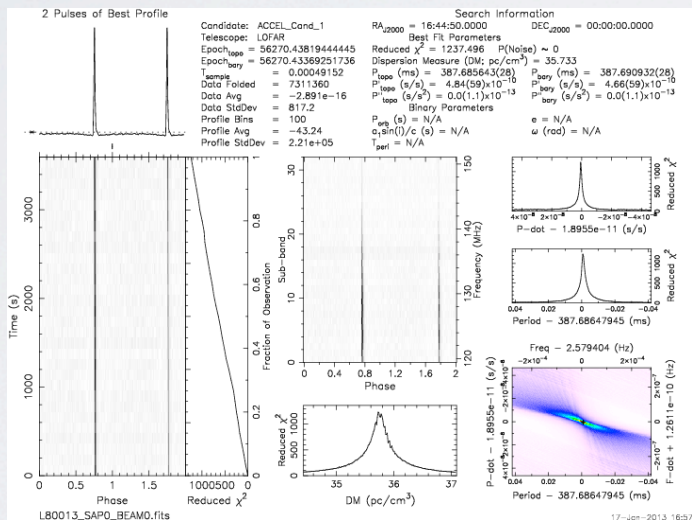
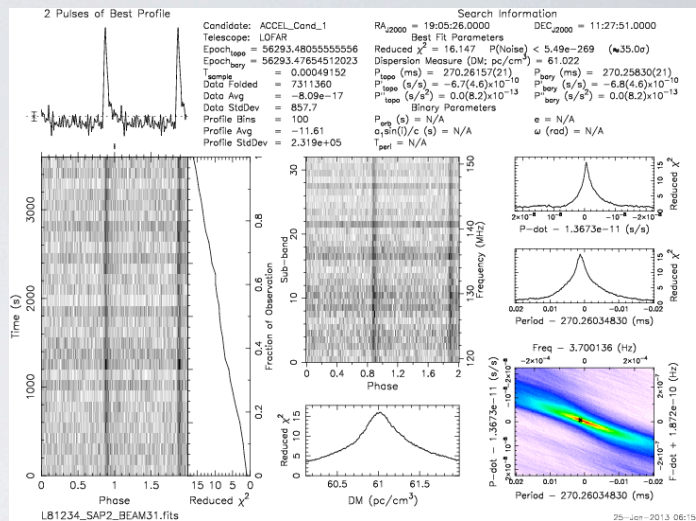
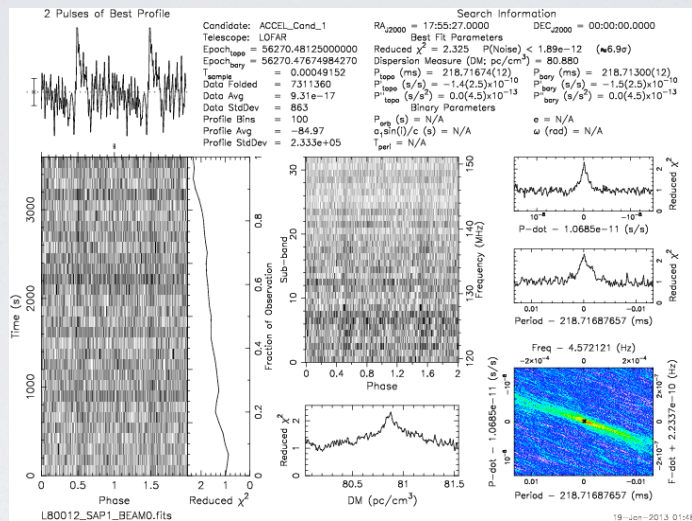
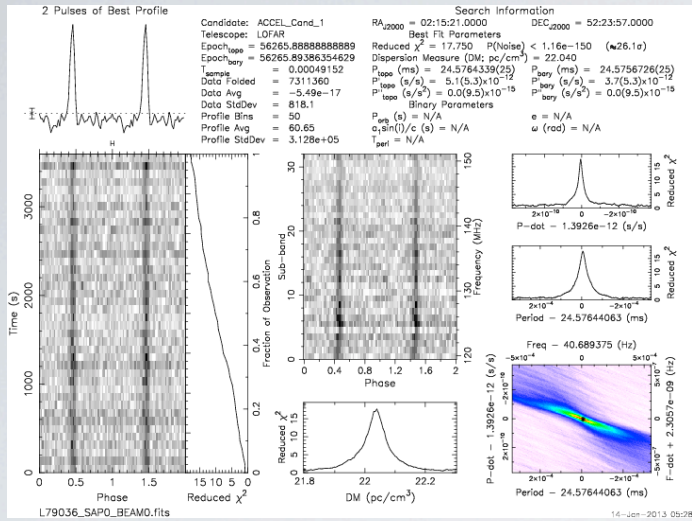
- Received 200hrs for LCU\_034 in Cycle0.
- Started observing early December.
- 1hr = 15.7TB of 32-bit data converted to 4TB of 8-bit data.
- Data rate 36Gb/s (half the system's max capacity).
- Data drop percentage on average ~0.2%.
- **131 pointings taken so far**, all pipelined using “Pulp”.
- **515TB of 8-bit data taken so far**.
- Observing mostly in the Dec 10-15deg range to start.
- Taking 10-15 pointings per week in two sessions.
- At this rate, should take **another ~1.5 months to finish** LCU\_034 observations for Cycle0.

# LOTAAS Search Processing

- At SARA and the University of Manchester.
- 200 8-core nodes available in total.
- Expand to more nodes in the coming months.
- One 100-node cluster can do a quick processing of a single pointing in ~14 hrs.
- 7000 trial dispersion measures must be searched.
- 10 full pointings processed so far, now quickly ramping up the processing.



# LOTAAS Redetections



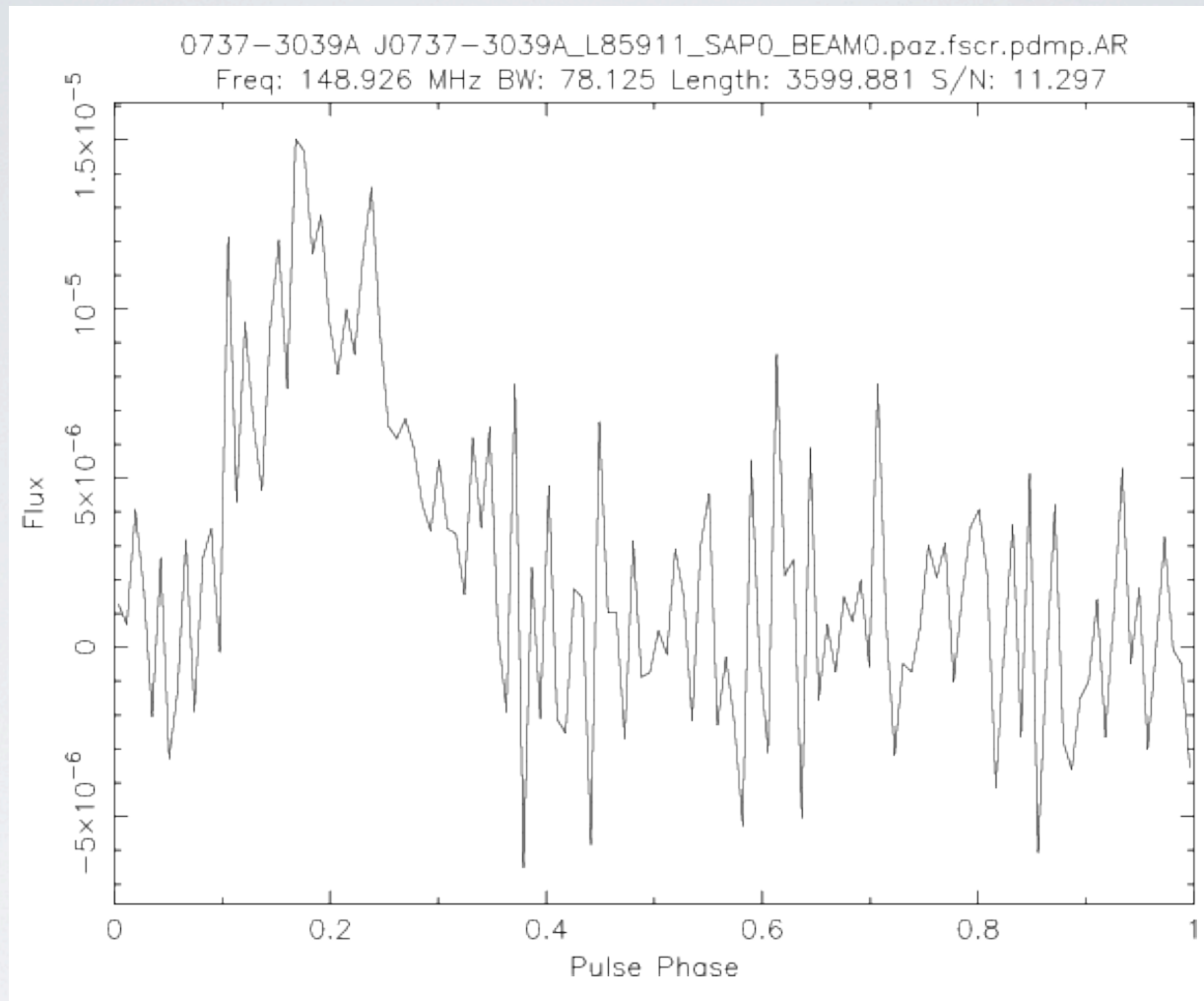
Courtesy Sally Cooper

RFI not a major limitation so far

# Monthly (3hr/month) timing campaign has started

Pulsar	Comment	Single Epoch DM prec.	VLSS (mJy @ 74MHz)	KL01 (mJy @ 103MHz)	LOFAR SNR (in 20m)
J0030+0451	EPTA2, NGAO			380	137
J0034-0534	EPTA3			250	395
J0613-0200	NGGB, PPTA			240	
J0621+1002	EPTA2			50	40
J0751+1807	EPTA2			70	
J1012+5307	EPTA1, NGGB	0.0003		30	51
J1022+1001	EPTA1, PPTA			90	76
J1023+0038	Redback				
J1024-0719	EPTA1, NGGB, PPTA			200	24
B1257+12	Planets			150	132
J1640+2224	EPTA1, NGAO			450	41
J1643-1224	EPTA1, NGGB, PPTA				
J1713+0747	EPTA1, NGGB, NGAO, PPTA	0.0003		250	9
J1738+0333	EPTA2, NGAO	0.001			12
J1741+1351	EPTA2, NGAO				
J1744-1134	EPTA1, NGGB, PPTA	0.0001		220	12
J1810+1744	Black Widow	0.00001	1290		673
B1855+09	EPTA1, NGAO, PPTA	0.001		450	8
J1911-1114	EPTA3			260	22
J1918-0642	EPTA1, NGGB				
B1937+21	EPTA, NG, PPTA				
B1957+20	Black Widow		1360		58
J2145-0750	EPTA1, NGGB, PPTA	0.00005		480	~150
J2317+1439	EPTA1, NGAO			90	86

# LC0\_011: Double Pulsar “A” Detected!



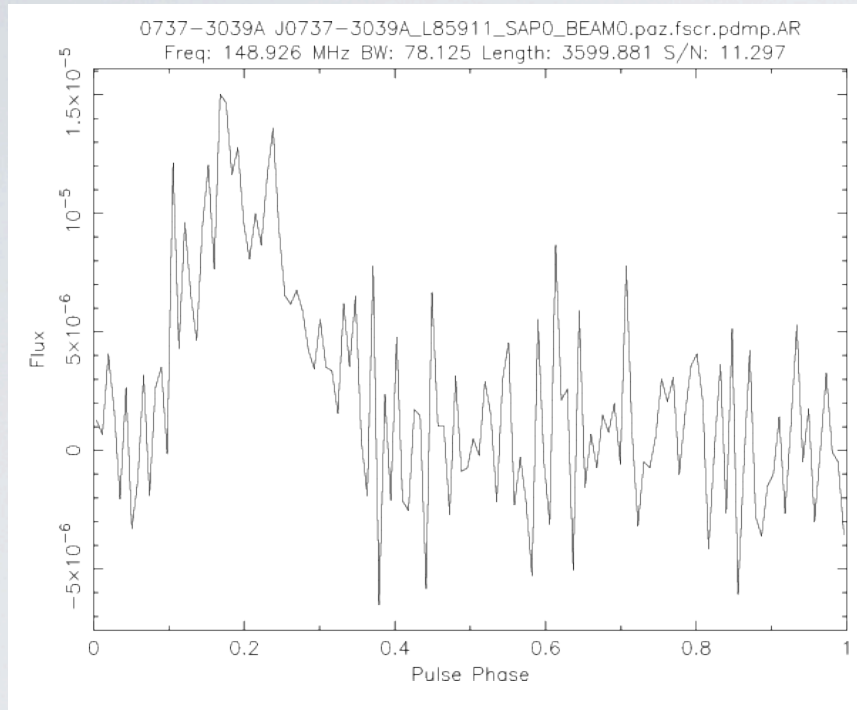
Courtesy Vlad Kondratiev

Elevation only 6 deg at transit

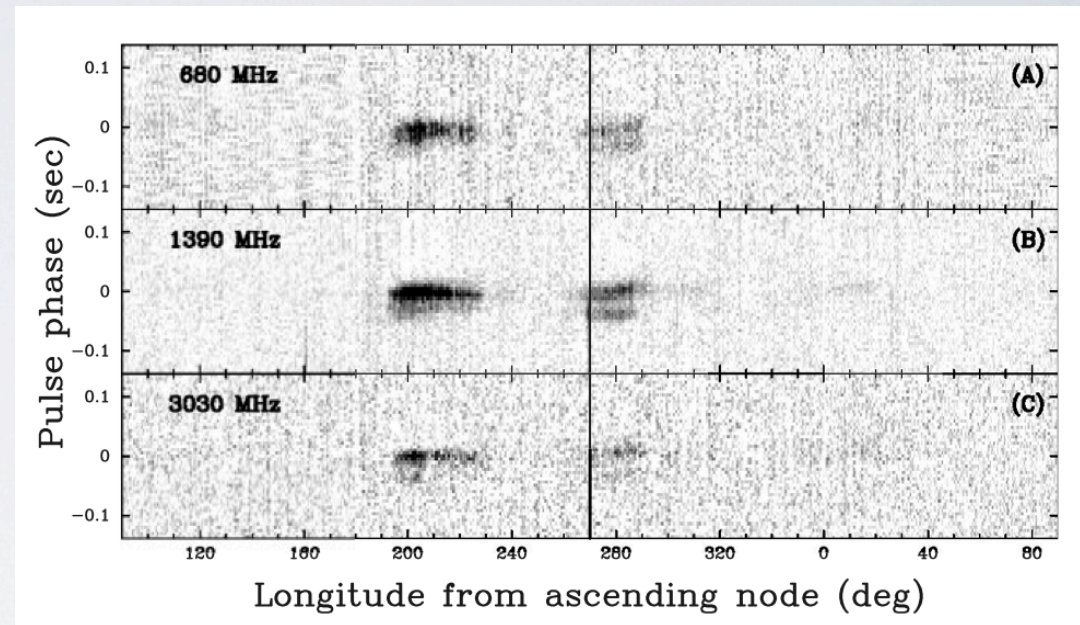
Order of magnitude hit in sensitivity



# LC0\_011: Double Pulsar Detected!



High-precision DMs for  
pulsar A



Can we also detect  
pulsar B?